approach

JANUARY 1978 THE NAVAL AVIATION SAFETY REVIEW

UP DOWN ISOLATE
PICK THE RIGHT ONE!

• During an acceptance flight for an A-7E, the landing gear and flaps were extended via the emergency extension method in accordance with NATOPS. During landing rollout, the pilot checked the brakes (anti-skid selected) and observed good braking action. However, with about 3000 feet of runway remaining, the pilot reapplied the brakes and found them totally ineffective. Nose gear steering was selected, but it too was inoperative. The aircraft departed the runway at a slow taxi speed.

• Approaching the break at 350 KIAS, the A-7B pilot inadvertently extended the leading edge flaps 130 knots above the maximum allowable extension speed, causing damage to the leading edge flap assembly.

• An A-7E pilot landed as No. 4 on a day VFR recovery aboard an air station. He found himself rapidly overrunning No. 3 and advised him to stay on his side of the runway so he could overtake him. The speeding pilot then found himself closing on No. 2, so he applied heavy braking, blowing the starboard tire. The aircraft remained on the runway and was able to engage the overrun gear on the 12,000-foot runway. But in addition to blowing the starboard tire, the port brake fusible plugs melted, and the port brake assembly froze. Cause of the large speed differential in the flight was No. 4's flaps-up landing.

THESE three seemingly unrelated accidents have more in common than simply happening to the same series aircraft (A-7). These three mishaps – and quite a few others – were all caused by pilots mispositioning the flap handle. To understand how this can lead to accidents, it is necessary to discuss briefly the functions and design of the flap handle.

In the A-7, the flap handle does considerably more than merely raise and lower the trailing and leading edge flaps. As shown in Fig. 1, the flap handle panel includes an ISO UTILITY position in addition to flaps UP and DOWN detents. Placing the flap handle in this ISO position isolates certain hydraulically operated components such as the wheel brakes, landing gear, flaps, tailhook, NGS (nose gear steering), and wingfold. When these components are isolated, a valve is closed, preventing hydraulic fluid from flowing to them and thus making actuation impossible.

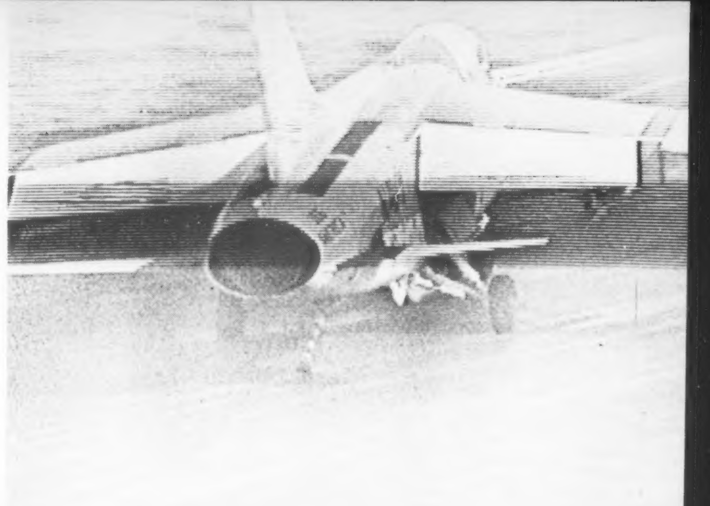
This isolation feature has several maintenance and safety advantages, but it also sets up several situations that can – and have – led to mishaps. Specifically, the major problem areas are as follows:

A. Leaving the flap handle in ISO after use of the emergency gear and flap extension system.

B. Accidentally lowering the flaps at a higher than allowed speed.

C. Landing with the flaps inadvertently left up.

The most comon ISO-related mishaps have occurred as a result of problem A. This kind of mishap usually occurs on functional checkflights or other flights where the gear and flaps are blown down using the hydraulic/pneumatic accumulators while normal PC-2 (utility) hydraulic pressure is still available. Anytime the gear and flaps are blown down, the flap handle remains in ISO until the gear and flaps are down and locked. The pilot should then select flaps DOWN to regain normal PC-2 pressure. If he forgets to



Leaving the flap handle in ISO after landing can have disastrous consequences.

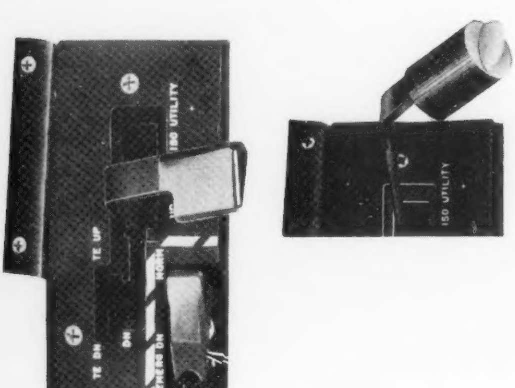


Fig. 1

After lowering the gear handle, the pilot inadvertently selected ISO instead of FLAPS DOWN. The photo is of a test aircraft in the same configuration as that of the accident aircraft.

reposition the flap handle, he will not have use of the components that are isolated, including the normal wheel brakes and NGS. The pilot is then limited to about six toe brake applications from the utility brake accumulator (used up almost immediately if anti-skid is selected). Once they are gone, toe brakes are ineffective. The end result often is an A-7 taxiing off the runway, as happened in the first example described at the beginning of the article. While these incidents ashore usually result in only minor damage, the same situation aboard a ship can spell disaster. Consider the following accident.

An A-7C pilot completed a functional checkflight while deployed, but elected to test the emergency gear and flap extension feature during the normal Case I recovery rather than at 5000 feet, as called for in the postmaintenance checklist. After a normal arrestment, the pilot could not raise the tailhook, requiring the deck crew to free the hook manually from the arresting gear cable. The nosewheel was also cocked to port, causing the *Corsair* to swerve left as the pilot added power to taxi clear of the landing area. The pilot was unable to straighten out the nosewheel and also lost braking capability. The aircraft continued over the side of the carrier as the pilot ejected.

Investigation revealed that the pilot had left the flap handle in ISO. He used up the brake applications available to him via the toe brake utility system and thus was unable to stop the aircraft from going over the side. Although the A-7 has a second emergency brake system – a hand brake – the urgency of the situation and panic probably prevented this pilot from finding and using the handle.

There have been six mishaps in the past 10 years that have followed this basic scenario – although the incidents ashore usually resulted in little or no damage. One of these incidents occurred when the pilot was practicing emergency gear and flap extension in conjunction with a training hop. All the others were associated with functional test flights. The test flight profile and checklist cover the procedures for blowing the gear and flaps down in detail, including a caution to ensure the flap handle is placed DOWN after the gear and flaps are down and locked. Broken habit patterns or distractions usually existed in the mishaps where this was not done.

While the majority of mishaps associated with the flap handle occurred in the above manner, there were nevertheless a substantial number of incidents related to extension of the flaps above max allowable airspeed. This kind of mishap usually occurs when the pilot forgets to go to ISO after takeoff. Then, when preparing to extend the gear and flaps, he thinks he is in ISO and lowers the flaps to the next lower detent. This, of course, happens to be flaps DOWN, and the rather fragile leading edge flaps of the *Corsair* sustain damage.

The third major area of mishaps involves flaps-up landings. Here, the pilot, often distracted during his normal landing sequence, lowers the flap handle one detent, thinking he is selecting flaps DOWN. This, however, serves only to move the handle from ISO to flaps UP. The result on several occasions has been a flaps-up landing. This can spell trouble, particularly in multiplane formations.

In addition to these general categories, there have been other mishaps that have occurred in conjunction with this system.

Two examples:

• Following a normal day break overhead a CV, an A-7E pilot extended the gear (flap handle was UP). The gear started to extend, and the pilot went to move the flap handle to lower the flaps. Inadvertently, however, the pilot put the flap handle in ISO rather than flaps DOWN, removing hydraulic power from the gear and flaps. The mainmounts continued to free fall to a down-and-locked position, but the nosewheel, extending against the airstream, stayed up, although the nose wheelwell doors were partially open (opposite).

This configuration enabled the LSOs on the platform to see the approach light. Thus, even though the aircraft rolled into the groove very fast (175 KIAS) with flaps up and no nosewheel, all seven LSOs and spotters on the platform – in addition to the pilot – failed to notice. The *Corsair* engaged the No. 4 wire, causing the nose to pitch through to the deck, inflicting minor damage.

• An A-7B pilot experienced a droptank transfer failure. In accordance with NATOPS, he extended the EPP (emergency power package) in an attempt to obtain transfer. When this failed to correct the problem, the pilot restowed the EPP. He then attempted to move the flap handle from ISO to UP, since this is necessary to recharge the EPP extension/retraction accumulator. Unfortunately, he missed the UP detent and continued to the DOWN position, extending the flaps at a higher speed than allowable. He then immediately returned the flaps back up. This combination of exceeding extension speed and reselecting flaps UP immediately resulted in considerable damage to the leading edge flaps and hard harness.

Given the incidence of mishaps associated with this system, the logical question arises if the system is worth the risk. The answer is a definite "yes." By isolating most of the large hydraulic actuators, hydraulic pressure pulses on these components are prevented during flight. This considerably reduces leakage and failure in these parts, which in turn lessens downtime and decreases the likelihood of an inflight emergency. Also, the isolation feature prevents total loss of PC-2 hydraulic pressure if a leak or damage occurs in one of the isolated utilities. This is a particularly useful feature during combat operations, especially in the earlier A-7s that have only two hydraulic systems. Finally, the ISO position is being used to energize the automatic maneuvering flaps that are being retrofitted onto the A-7.

If the design is good, the answer to preventing mishaps associated with the ISO position must lie in pilot education. And the evidence is that this is being done effectively. AIRLANT, for example, has not had a mishap of this nature since 1974, and the overall frequency of these mishaps has been declining Navywide. To continue this trend, squadrons may want to consider some of the following suggestions:

• Carefully screen and limit the number of functional test pilots. An experienced, well-trained test pilot flying functional checkflights often enough to stay current is the key to flying these relatively demanding hops safely.

• Train for functional checkflights in the simulator.

• Strictly adhere to the published test profile. Avoid the temptation – particularly around the ship – to blow the gear and flaps down during a normal VFR recovery sequence.

• Alert Pri-Fly watchstanders to the following symptoms of having the flap handle in ISO after landing: hook won't come up, nosewheel castering, wings unable to fold. If the observers notice these characteristics, they can ask the air boss to remind the pilot to check his flap handle out of ISO.

• Establish a strong squadron standardization program that ensures all pilots go to ISO at the same point after takeoff and come out of ISO at a particular time in the landing sequence. Also, emphasize to pilots the need to look at the flap handle position prior to moving it, when at all feasible.

The ISO feature and associated flap handle positioning is not complicated. Like so many procedures in aviation, however, acting from memory, habit, or without thinking can cause error. The trend toward reducing these mishaps is favorable. Continued concentration on pilot education in this area can make flap handle mispositioning incidents truly "isolated" occurrences.

APPROACH is a monthly publication published by Commander, Naval Safety Center, Norfolk, VA 23511. Subscription price: $11.70 per year; $2.95 additional for foreign mailing. Subscription requests should be directed to: Superintendent of Documents, Government Printing Office, Washington, DC 20402. Controlled circulation postage paid at Norfolk, VA.

The K.I.S.S. principle and your pre-mishap plan

By LCDR C. R. Saffell, Jr.
RVAW-120

OK, old safety salts, put yourself in the shoes of your young neophyte squadron duty officer. It's Friday evening, and all's quiet in the hangar. You have one bird on a cross-country, and the others are safely parked on terra firma with your trusty integrity watch guarding them. Things are going well. That special position of being the CO's direct representative is a piece of cake. As you step out on the balcony and survey your vast domain, you hardly notice the phone ringing. But you are yanked back to reality by the frantic beckoning of your ashen-faced assistant duty officer. As you grab the phone, he mutters something incoherent about an aircraft accident. Your mind races! You remember something about a crash folder from the SDO indoc brief. Where is it? What do I do? You start getting the details of the mishap written down as you thumb through the telephone-book-size crash folder. Oh, there it is – the pre-mishap plan. My God, it's 75 pages long! What's worse, it's written in Naval Instruction format. What's this other thing, OPNAVINST 3750.6? It's the size of a book! What do I do first? Why can't this be a simpler process?

It can! Here's how. KISS is an acronym for "Keep It Simple, Stupid." Its meaning is obvious, but its applicability to your pre-mishap planning may not be so apparent. Safety officers, give your SDO a break! That voluminous black binder that contains the answers to every secret may be a little overpowering for the average guy. Don't forget, they sent you to safety school for 6 weeks, and at times, the interpretation of the instructions leaves the non-school graduate a little high and dry. Also, remember when this thing is going to be used. Right! When a mishap has occurred. Everyone will be at a heightened state emotionally, and the time to act is greatly compressed.

Maybe the KISS acronym's meaning could be modified a bit to "Keep It Simple Safety," and that's exactly what I am suggesting for your pre-mishap plan. The vehicle for the KISS pre-mishap system is a flow chart and an index of 5- by 7-inch cards with specific instructions for the SDO, CDO, or even ASDO to follow in case of mishap. The flow chart opposite is similar to the one used in this command. It can, however, be modified slightly or tailored to your specific type of activity. The chart is laminated and resides with a yellow and black border on the wall of the duty office next to the SDO's desk.

Below the chart is a small card file with 5- by 7-inch cards. Each card or set of cards has a different colored border, depending on its use. The card file is physically arranged like a NATOPS pocket checklist with the cards in easily removable, clear plastic pouches.

A description of the color-coded cards follows:

Yellow cards. These cards are the first cards acted upon and give the following instructions: "Should you be apprised of an aircraft mishap (aircraft or ground accident/incident):

(1) Hold the person you are speaking to (on the phone/radio/in person).

a. Remove all yellow-bordered cards and PRINT as much information as possible.

b. Maintain a running log of all events.

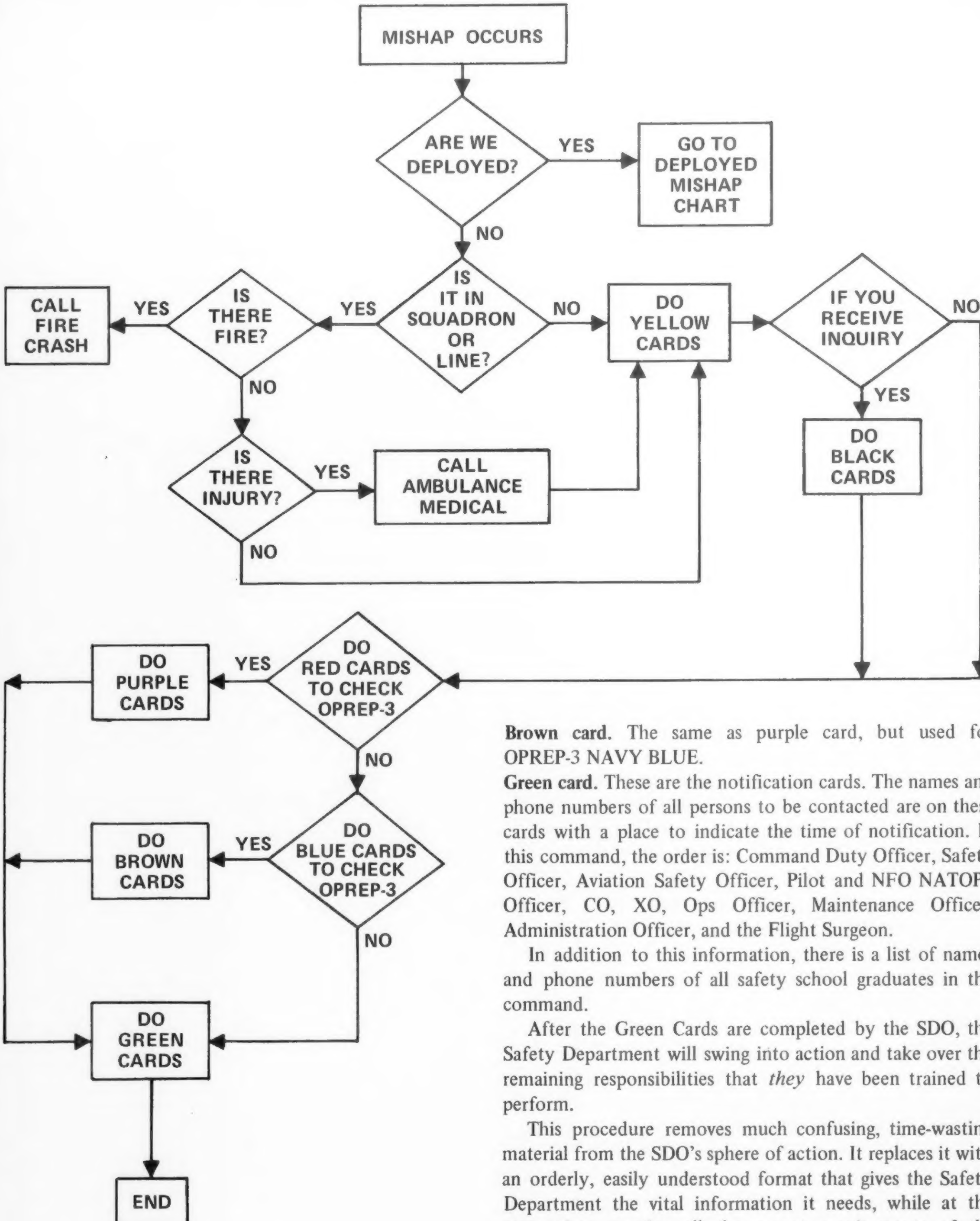
The use of the yellow cards is an initial contact information form that guides the SDO in asking questions to gain pertinent initial facts.

Black card. This card deals with any inquiries that are made about the mishap from unofficial sources. It should contain instructions in handling these calls and phone numbers of appropriate PAO referrals.

Red card. This card is used as a simplified guide in determining if the mishap requires an OPREP-3 PINNACLE.

Purple card. These cards are the instructions for executing the OPREP-3 PINNACLE with the appropriate time limits, telephone numbers, and addresses.

Blue card. The same as red card, but used for OPREP-3 NAVY BLUE.



Brown card. The same as purple card, but used for OPREP-3 NAVY BLUE.

Green card. These are the notification cards. The names and phone numbers of all persons to be contacted are on these cards with a place to indicate the time of notification. In this command, the order is: Command Duty Officer, Safety Officer, Aviation Safety Officer, Pilot and NFO NATOPS Officer, CO, XO, Ops Officer, Maintenance Officer, Administration Officer, and the Flight Surgeon.

In addition to this information, there is a list of names and phone numbers of all safety school graduates in the command.

After the Green Cards are completed by the SDO, the Safety Department will swing into action and take over the remaining responsibilities that *they* have been trained to perform.

This procedure removes much confusing, time-wasting material from the SDO's sphere of action. It replaces it with an orderly, easily understood format that gives the Safety Department the vital information it needs, while at the same time meeting all the urgent requirements of the situation. It truly does meet the criteria of Keeping It Simple Safety.

The VS-21 "Back to Health" campaign

or HOW TO SAVE

IN Naval aviation circles, physical fitness is rather akin to the flag and mom's apple pie – everyone is for it. One would be extremely hard-pressed to find a Naval aviator who did not firmly believe that the physical demands of his profession require him to be in the very best possible condition. The trouble is that all too few of us really do a whole lot about it, and by and large, the system doesn't help us a great deal. Completion of the obstacle course somewhere around the end of preflight, for most of us, marked the last time the Navy would place any serious demands on our bodies. The old "JFK" Program seemed a nice idea, but all too often, the degree of attention paid to it was directly proportionate to the physical condition of the unit's skipper. All of this, combined with our modern day smoking, eating, and drinking habits, has caused many of us to be a little further out of condition than we'd like to be.

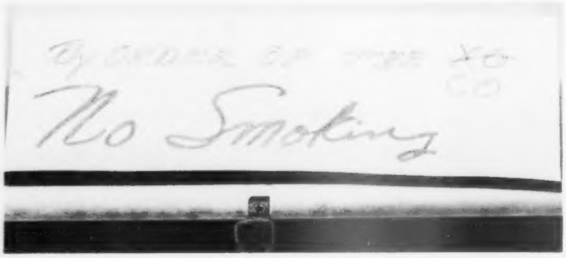
This fact was painfully evident when VS-21 embarked recently on CONSTELLATION for a 7-month WESTPAC cruise. The number of overweight officers in our midst was appalling. Quite a few of us, in fact, had trouble locating our "I've been there" belt buckles amidst all the chub down around our bellies. It was clearly time for a "back to health" campaign, but talking about one and then doing something about it are two entirely different things. An aircraft carrier at sea is not the world's easiest place to get in shape. Due to very real space limitations, CONNIE's "workout" room is small and not always available. To add fat to the fire (no pun intended), that ship probably has the best stocked gedunk stores and smoke shops in the Pacific Fleet. Have you ever noticed how easy the Navy makes it for people to buy candy and cigarettes? The wardroom mess was both a help and a hindrance to the situation. It provided an excellent salad bar both at lunch and at dinner,

YOUR OWN LIFE

By CDR Dallas B. Boggs
Commanding Officer, VS-21

but it also provided a seemingly endless supply of doughnuts, buns, bread, potatoes, and ice cream, plus a late snack bar facility and free soft drinks. And don't forget the popcorn. It was free and plentiful at all the evening movies. All of this adds up to something less than a dieter's paradise, particularly if the dieter is short on willpower.

What's a mother to do? Well, since willpower seemed to be the key, we decided very early on to reinforce each man's willpower through group effort. Another effective way of strengthening willpower is through direct command edict, so the very first step taken was to make the VS-21 readyroom a full time "no smoking" space. Ready Five became notorious throughout the ship as the only "no smoking" readyroom aboard, and we occasionally found ourselves playing host to visitors who dropped in just to see if it were true and to sample the clean air. We cannot say that the readyroom smoking ban was a direct contributor to causing people to quit (although five officers did in fact quit smoking during the cruise), but we can state that it was a very concrete means of lending command emphasis to our



entire "back to health" program. As a side benefit, it certainly made the readyroom more habitable for our nonsmoking majority.

The next step in the plan was aimed at conditioning. To this end, a noncompulsory jogging program was established. On CONNIE, this generally meant rising at 0630 or so to take advantage of the flight deck prior to flight quarters. We determined the number of circuits on the flight deck that made a mile (roughly three) and the amount of time it took our average jogger to run a mile (about 8 minutes). (Our more devoted enthusiasts bridled at the term "jogger," preferring to be labeled "runners.") After that, it was every man for himself insofar as personal standards and recordkeeping were concerned. Out of our hardcore participants in the program evolved a sort of "joggers anonymous" hotline by which backsliders were, from time to time, awakened at 0630 or so with exhortations to jump into their sneaks and get themselves up to the flight deck.

The dieting phase of the program was also attacked by means of a group effort. I'm not sure how "Weight Watchers, Inc." does it, but what we did was establish a contest whereby that officer losing the most weight over a given time span (usually an at-sea period) was rewarded with a meal at a restaurant of his choosing in the next liberty port. (This system has its drawbacks – the first winner almost negated his entire weight loss in that one free meal.) We maintained a duty scale in the readyroom and kept a very visible "howgozit" chart which was updated every other day. The sight of assorted officers wandering about the front of the readyroom in their skivvies prior to the weigh-in ritual was a constant source of amusement for the troops. The program suffered only one minor setback when one disgruntled, overweight participant executed a standing broad jump to the scale, resulting in a permanent reading of 326 pounds.

When on the beach at NAS Cubi Point, the ready availability of the Club and its attendant delights soon necessitated a serious beefing-up of our physical conditioning requirements ashore. This was accomplished by means of a very popular double elimination racquetball tournament, participated in avidly by all hands – old pros and rank amateurs alike.

Before long, the spirit of the overall campaign became infectious. Maintenance work centers began to set up programs of their own, with specific times set aside during the workday for calisthenics right there in the shop spaces. Participation, always voluntary, soon began to include our diehard fatties, as these heretofore incurables began to realize that proper diet and exercise really could get results. All in all, it's been a great success. We have accounted for a total weight loss of over 300 pounds (that's almost two whole aviators), and it has been relatively painless. A little command emphasis, a large degree of command participation, and a sincere group effort have been the major ingredients. The finished product is a readyroom full of flightcrews who look better, feel better, and have a higher opinion of themselves now than they did before the program began. They never want to climb back into their old bodies again. This doubtless means that they are now better able to perform their mission, both on the ground and in the air. And that, after all, is what it's all about.

Bravo Zulu

LT Joseph Sciabarra
NATC Patuxent River

LT Joe Sciabarra of the Naval Air Test Center took off from NAS Cecil Field in an A-7E to conduct tests in W-158, east of Jacksonville. The purpose of the flight was to record TF-41 engine AST (Accelerated Service Test) parameters with onboard instrumentation.

The flight profile consisted of throttle cycles and high G turns at various altitudes from 5000-30,000 feet and 12 simulated dive bomb runs with 4G recoveries. After completing the 5000 and 20,000 portions of the profile, LT Sciabarra was pulling out from the final bomb run at 5500 feet MSL, 475 KIAS, when he experienced high frequency "popcorn" compressor stalls of about 5 seconds duration. The stalls cleared immediately when the throttle was reduced to IDLE. He zoomed the aircraft to 10,000 feet, set the power at 85 percent RPM, and verified his position — 60 nm southeast of Cecil.

Once established on a heading toward Cecil at 300 KIAS, the pilot contacted Jax Center, advised them of his engine problem, and declared an emergency. About 30 nm east of the field, LT Sciabarra experienced compressor stalls again, this time of a low frequency, popping nature. He reduced power slightly, and the stalls cleared momentarily. By the time he was 20 nm from Cecil, the stalls were occurring with increasing regularity and his airspeed had bled off to 220 KIAS. He reduced throttle to IDLE, selected manual fuel, and set 80 percent RPM. Jax Approach notified LT Sciabarra that Runway 36L (8000 feet) was available at Cecil, but that 36R (12,000 feet) was closed.

At 15 nm, the low frequency stalls became continuous, the throttle was reduced to IDLE, and a 220 KIAS glide was established. Passing 5500 feet, LT Sciabarra made visual contact with the field, switched to Cecil Tower, and set up for a point 2000 feet and 3 nm from 36L. Landing gear and flaps along with the tailhook and emergency power package were extended passing 2000 feet. The aircraft crossed the runway threshold at 200 KIAS and touched down 2000 feet down the runway at 180 KIAS. The tailhook skipped the E-28 arresting gear located approximately midfield, and the pilot commenced braking for the remaining 3000 feet of rollout. The aircraft continued on centerline, engaged the E-5 overrun gear at an estimated 50 knots, and the engine was secured. The A-7E came to a halt 500 feet into the overrun, and the pilot egressed normally. No damage to the aircraft was sustained. The engine was subsequently removed by VA-174 and shipped to NARF Jax for investigation.

LT Sciabarra's professionalism in handling this emergency saved a valuable test and evaluation aircraft. His thorough knowledge of emergency procedures and aircraft systems coupled with decisive action qualifies him for a Bravo Zulu.

Ten minutes can seem like 10 hours when you have 43 souls onboard and it's confirmed you're . . .

ON FIRE!

THE C-118 departed NAS Atlanta on a scheduled airlift to transport 35 squadron personnel from NAS Jacksonville to NAS South Weymouth.

At Jacksonville, after the confirmed load was aboard and it was determined there were no hitchhikers to go north, the crew fired up and taxied out. The pilots completed their runup just as the clearance came in, and they were cleared to go.

On takeoff, all gages were normal, except the flight engineer noted No. 1 engine BMEP (brake mean effective pressure) was slightly lower than the other three. By the time the aircraft climbed to 2000 feet, the aircraft had been cleaned up and climb power had been set. The flight engineer saw and reported that No. 1 engine BMEP gage was still less than the other three. He took a look at the engine analyzer, which indicated two cylinders on the right magneto had shorted spark plugs. Number 1 engine was slowly continuing to lose power, and the flight engineer recommended reducing power or securing the engine and feathering the prop.

The pilot continued to climb while the copilot, after an agreement had been reached, reduced power. However, the No. 1 engine began to run very rough and was shut down and the prop feathered. While the engine failure checklist was being completed, the firewarning light came on, indicating a fire in zones 2 and 3.

A third pilot in the crew, who had extensive experience in the C-118 but was not current at the time, went back to the passenger compartment, saw the engine on fire, and reported it to the pilot. In short order, the pilot pulled the No. 1 fire extinguisher and began a descent. The copilot declared an emergency with Jax Center, and the pilot pulled the second fire extinguisher. The fire did not go out.

The pilot spotted an airport between the clouds (thought it was the old Imeson airport) and advised Center he would head for it. Center told them they were headed right at Jax International, only 7 miles away, and recommended they proceed to Jax International. Quickly, the pilot changed his mind and headed straight in for International's Runway 31.

The copilot had switched frequencies and kept the tower advised of their progress after Jax Center had alerted the tower. At 3 miles on final, the pilot slowed down the aircraft and dropped the gear and flaps. They landed 700 feet down the runway. He stopped on centerline at 5000 feet – they were still burning!

The Jax International crash crew was on the scene as soon as the C-118 stopped, and had the fire out in a minute or two. Meanwhile, the majority of the passengers and crew evacuated over the starboard wing and down the flaps. Two of them went out the main entrance door and down a ladder before the crew could stop them. All passengers and crew escaped without a scratch.

Investigation revealed No. 6 and No. 8 cylinders had failed, allowing engine oil to leak from the engine case, across the hot exhaust system, ignite, and burn out the outer half of the cowl flap screwjack. The flames then burned out the rubber mounting bushings which support the jack in the engine section inner ring and baffle. (The latter acts as a flame shield between the accessory section of the engine and the cylinder/exhaust area of the engine.)

Anyone who has ever flown an aircraft can empathize with this flightcrew. They proved beyond doubt the value of being prepared, coordinating cockpit duties, and communicating with Approach. No less important was the service rendered by Jax Approach and the outstanding response of the Jax International crash crew.

It was a coordinated and professional effort by all involved that saved the day – and 43 lives.

Scratch one Trojan!

AT 1856 local time, a T-28, call sign 8138, called Approach Control and reported he was at 3000 feet, 5 miles south of the field, and was requesting a VOR approach. Approach assigned an expected approach time of 1910. 8138 rogered and advised he would proceed to the VOR and hold.

At 1905, Approach contacted 8138. He was outbound on the published holding heading (assumed VFR since no IFR clearance had been issued). Approach cleared 8138 to descend to minimums at pilot's discretion and was cleared for a VOR approach. The pilot was further advised of the duty runway, altimeter setting, and that another aircraft had just executed a missed approach. No weather was given, but it was 300 scattered, 4 miles in haze and fog, no spread in the temperature/dewpoint, and the field had been up and down.

At 1907, Approach requested 8138 to report the VOR inbound and when descending out of 2000 feet. The pilot immediately reported level at 1700 feet and a minute later reported the VOR inbound. He was switched to Homeplate tower. The tower requested he report when the field was in sight. The pilot acknowledged the request and was never heard from again. The aircraft crashed in trees, on centerline of the approach heading, 3 nm short of the field.

The aircraft was completely destroyed, and the pilot and a student were killed.

The instructor was exceptionally well qualified. He had 2400 total hours, almost 800 hours in model, and held a special instrument rating. He was a designated checkpilot in basic and radio instrument phases, a member of the NATOPS board, and had served as the squadron standardization officer.

His student was on his last basic flight and needed to complete only that flight before moving on. Inclement weather had backed up student progress, and a command decision was made that qualified instrument instructors would accompany the students that night in the back seat merely as safety pilots in case IFR flight was encountered. It was. The aircraft just in front of 8138 had shot a missed approach, and Homeplate reported a special weather observation of 200 broken, 2 miles in fog. Others had tried to get in VFR but had diverted to other fields when they ran into IMC.

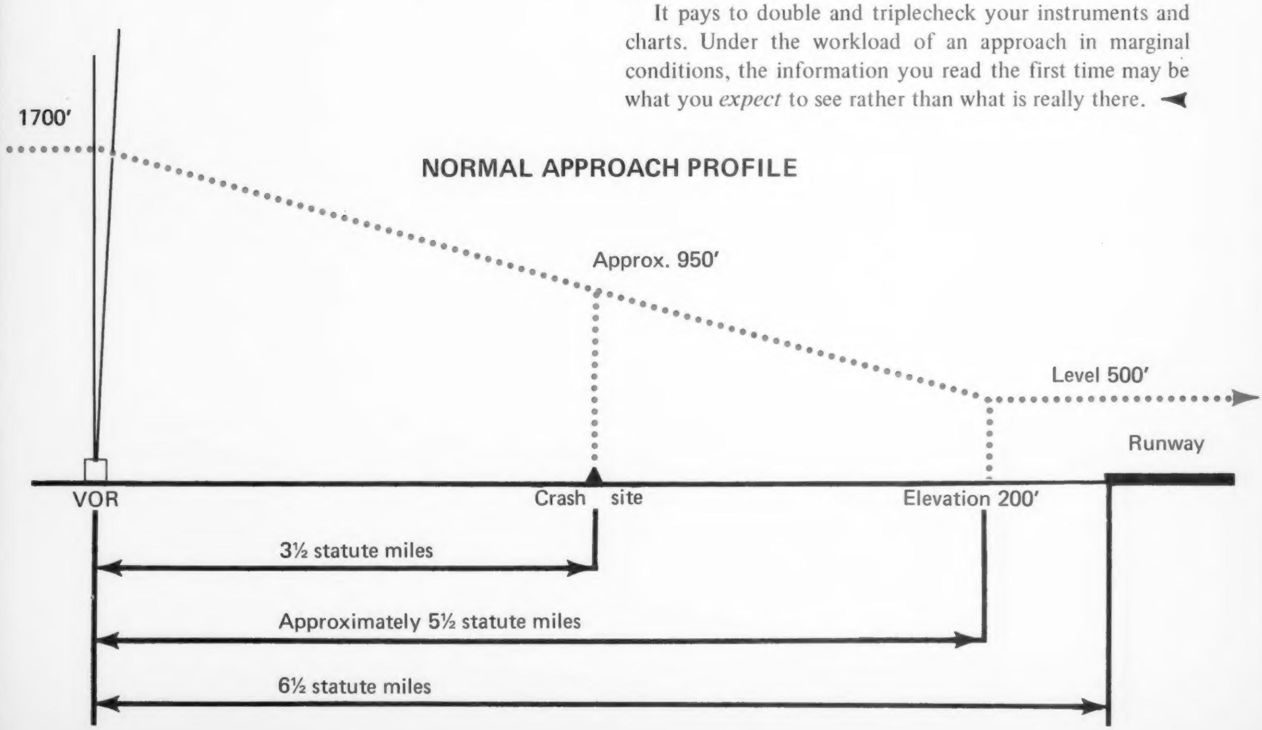
Most instructors that night had been assigned normal day flights, but they had been canceled due to the weather. So they had been on duty a full day before launching for night flying. The instructor of 8138 was notified during the afternoon that he would be flying that night. He called his wife and asked her to bring him his shaving kit, in case they launched but couldn't get back in. He was also upset at having to fly back seat.

There were no known or suspect aircraft or navaids malfunctions. At the time of the crash, the aircraft was in a landing configuration, and both engine and prop displayed rotational characteristics consistent with low RPM and power output. All the gages and switches were set normally, and flight controls and throttle linkages were apparently operating OK.

Evaluation flights were flown attempting to duplicate what the instructor in 8138 might have done to fly into the ground 3 miles short. If he had departed the VOR at 1700 feet, as reported, he would have passed over the crash site between 900-1000 feet altitude on a normal approach. However, an interesting possibility came to light. If he had misread his altimeter by 1000 feet and departed the VOR at 700 feet, a normal rate of descent would have terminated at the crash site.

It will never be known why the instructor busted minimums on his approach, but the most likely reason was misreading his altimeter. Even though there was a student pilot in the aircraft, his lack of knowledge of instruments and limited experience would not have been much help to the instructor. He probably had been briefed to maintain a lookout for other aircraft and to watch for the runway lights.

It pays to double and triplecheck your instruments and charts. Under the workload of an approach in marginal conditions, the information you read the first time may be what you *expect* to see rather than what is really there.



Anymouse

It Won't. It Did.

AN experiencedmouse properly preflighted his airplane (he thought), launched into the blue with his customary sharpness and *elan,* and climbed briskly to altitude whereupon the ordinarily trusty engine stopped. At first apparently unconcerned, Experiencedmouse carried out restart procedures and eased over a trifle closer to the shoreline. The engine paid no attention whatever and persisted in its lethargy.

Experiencedmouse set up best glide speed (which, in this airplane, yields a glide about like a flat rock). He thought he might be a trifle short on desired high-key altitude. Restart continued; every control in the cockpit was shoved, pulled, turned, and sworn at, but still without noticeable effect on the engine. He decided not to bother with high key at all, but probably could make low key.

Just as Experiencedmouse was noticing vividly that the propeller had nearly stopped, he gaged his chances of making a pattern entry at the lower 90-degree position and was about to complain to the tower when – lo and behold – the engine surged back to life with a throaty roar! Experiencedmouse thereupon calmly called the tower for landing and then greased it in, to the wonder of all.

Experiencedmouse (now Humblemouse) taxied directly to the ramp, and after making a brief head call and donning a change of clothes, began to ask the inevitable question "Why?" (or possibly, "Why me?").

On postflight inspection, Humblemouse found a *Sceliphron caementarium* (Drury) had nested in the fuel tank vent, resulting in a partial vacuum in the tank, thus causing fuel starvation. Fortunately, the mud dauber didn't really build for permanence and some air was able to seep in, accounting for the timely restart.

Lessons learned? Well, maybe:

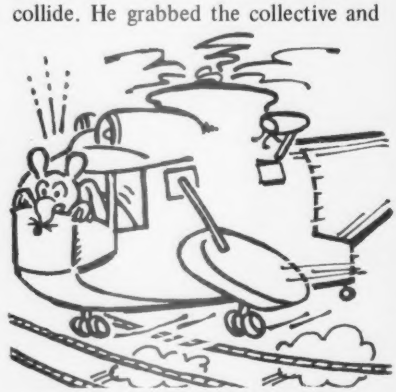
- The most experienced and supremely confident aviator in the world can be cut back down to size by an insect and a few grams of mud.
- A proper preflight is useful.
- Insects can do you dirt.

Entomologistmouse

Missed 'em

WE were flying a night fam and instrument training flight in our trusty SH-3 and had been airborne for about 3 hours. We picked up a strong emergency locater beacon signal, and with the tower's permission, were cleared to search the local area over a river and small bay.

We descended to about 175 feet so that the searchlight would cover the area as we zigzagged back and forth. The pilot was flying, and the copilot was leaning forward to see over the glare shield. Our airspeed was 60 knots. Suddenly the copilot saw an object with which we were about to collide. He grabbed the collective and



The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. These reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

REPORT AN INCIDENT
PREVENT AN ACCIDENT

cyclic to zoom over. We made it by the slimmest of margins.

The pilot recovered from the resulting unusual attitude, and we turned back to see what the object was. The object was a series of high tension lines completely unmarked and paralleling a bridge across the river.

Our search for a possible survivor of a disaster never turned up anything. The moral to the story: one has to be constantly alert to a gotcha, especially when you least expect it.

Searchmouse

Why Controllers Go Bananas

WHEN there are parallel runways and you're NORDO, you have a 50/50 chance of landing on the correct runway. Of course, if SOP is followed, your chances of landing on the correct runway are much better.

It seems this situation arose one day involving a flight of *Phantoms*. They didn't get off to a great start. They wheeled into the break in a diamond, and old NORDO broke fourth. He didn't see No. 1 land on 5L or No. 2 shoot an approach but wave off on 5L. He did hear on aux radio that No. 3 was going to shoot a touch-and-go. He assumed No. 3 would use 5L, and he would make a full stop on 5R.

NORDO dirtied up and brought it on around toward 5R but didn't feel comfortable until lead came up on aux radio and told him he was cleared to land. Lead figured NORDO would follow him on 5L. The tower had been advised of the problem and told to give NORDO a light, but no light was given.

NORDO turned off the 90 for 5R and smartly cut out an S-2 on final. The S-2 pilot saw the F-4 and averted a midair.

Needless to say, a NORDO shouldn't be brought back in a flight of four. SOP says two. A NORDO must watch for a light and traffic. When lead came up on aux radio, he didn't state what runway on which NORDO was to land. The tower didn't turn on any light, and NORDO didn't land on the same runway as lead. SOP says so.

Bookmouse

Hairy *Harrier* Hover

THE pilot of an AV-8A was all set to make a vertical takeoff from Homeplate. He added power for a 55 percent RPM check, eyeballed the nozzles, and turned on the water. He continued doing those things that only *Harrier* pilots do, such as moving the nozzle lever to the hover stop, and then put his hand back to the throttles to add power.

During the last hand movement, the pilot's sleeve caught the nozzle lever, pulling it forward. This moved the lever from the hover stop to something less. The pilot felt the nozzle lever being moved, grabbed it back to the hover stop, and grabbed the power back to idle.

Normally, not too many pilots tighten the strap around the flight suit wrist and pull the gloves over the end of the sleeve. More should, particularly in a *Harrier*. This would preclude the sleeve from catching on knobs and levers and doing just what this pilot did. The incident seems relatively unimportant, but suppose it happened during a shipboard takeoff or a confined area launch?

All pilots need to remember to purge the cockpit of anything which can cause inadvertent flight control movement.

Highpuckermouse

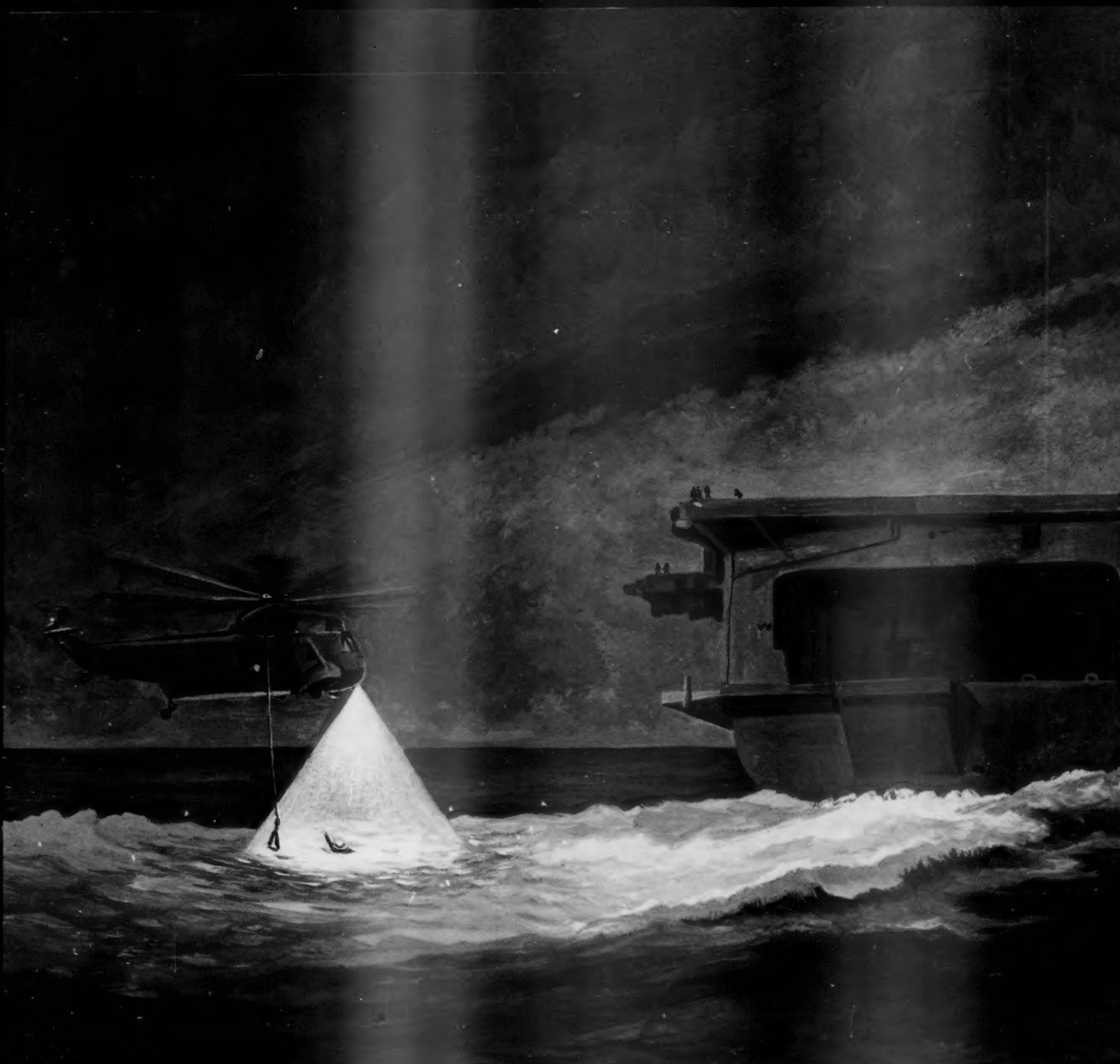
Things Go Better with Koch

UPON leveling off at FL310 after 15 minutes of flight in an S-3A, I looked at the aircraft commander and noticed his upper koch fittings were not attached to his torso harness. He had forgotten to hook them up when he strapped in at our cross-country base where no plane captain was available to assist him inside the cockpit. If we had ejected, this man would be dead.

Would you believe the same thing happened again a few weeks later, but with a different pilot? He was going through training in the S-3 but had considerable jet experience. If it has happened twice, it will probably happen again.

I recommend that plane captains actually physically hook up the upper koch fittings in the S-3. A note on the takeoff checklist might also help to catch this oversight in those cases where no plane captains are available. At the very least, check your attachments when the takeoff checklist calls for harness.

Detachedmouse



The message read: Approach to an arrested landing; first night approach, low start, overcontrolled a little, slow response to power call, aircraft hit rounddown, continued along angle; pilot ejected as the aircraft left the angle . . .

Successful night helicopter rescue

ONE second before ramp impact, the LSO called, "Power! Power! Waveoff! POWER!" The LSO also hit the waveoff lights. However, the waveoff was too late to prevent the aircraft from hitting the ramp about 2 feet below the lip of the flight deck. In the next 2 or 3 seconds, the pilot ejected by pulling the lower ejection handle.

The seat fired after what the pilot described as "an eternity" – it was long enough for the pilot to think it wasn't going to fire. However, the sensation of acceleration changed his mind, and shortly thereafter he experienced a smooth chute opening.

During the descent, the pilot began to think about things

picked up, and released the seat pan by disconnecting the lower Koch fittings. He swam toward the horse collar when suddenly it was jerked away as the helo broke hover.

The rescue helo had incurred a doppler failure and was unable to hover. The pilot departed for the ship. At first, the survivor, not knowing what was going on, became confused and angry. He also became aware of how cold he was. He began to shiver, and his teeth chattered uncontrollably. He knew, despite his discomfort, that it was time to break out his strobe light and prepare for a survival situation that might last for some time.

After a few minutes fumbling, the survivor actuated his strobe light. Meanwhile, as soon as the carrier learned the rescue helo was returning emptyhanded, the standby helo was alerted and launched as quickly as possible. The pilot of the standby helo saw the strobe, closed its position, and lowered the horse collar.

After the collar reached him, the survivor lowered his clear visor, climbed in, and made an extra effort (despite shaking badly) to hold on tight. He gave a thumbs-up and then felt himself being dragged through the water. He experienced great difficulty in breathing, as sea water filled up under his visor. He was about to release the collar and fall back into the water – to breathe – when he was hoisted out of the sea.

Once level with the cabin, the crewmen had trouble getting the survivor out of the collar. The crewmen finally got him into the helo, stretched him out on the helo deck, and elevated his feet. He was in shock and ached all over. The distance to the carrier was quickly covered, and after landing, the survivor was carried to sickbay and examined by the flight surgeon. He had been in the 60-degree water a little less than 40 minutes.

The inordinate time to make the rescue, so close to the ship, reduced the pilot's chances for survival. There have been far too many instances of pilots and crewmen who have not survived for more than 3-5 minutes. They've drowned because of incapacitation, become entangled in shroudlines, been caught on a piece of wreckage and dragged down.

to do before getting wet. He inflated his LPA, and both sides filled as advertised. He was reaching for the Koch fittings as he entered the water. The chute dragged him an estimated 15 feet before collapsing. His now released chute was seen floating 50-100 feet along the port side of the carrier. The LSO made positive identification of the pilot's position from the platform with a handheld spotlight which reflected brilliantly off the helmet's tape. Several flares and smoke lights were thrown from the ship in the pilot's vicinity.

The rescue helo was on the scene immediately. It circled the pilot once, began an approach, and started to lower the horse collar. The survivor assumed he was about to be

However, the survivor in this story was lucky! He entered the water uninjured, and although numb with cold, he was able to assist himself when rescue finally came.

Because the survivor committed himself to the first rescue attempt by releasing his seat pan and raft, he jeopardized his chances for survival when the first rescue attempt failed. But standard rescue procedures call for the survivor to move away from the raft for helo rescues. In such a situation, the rapid availability of additional rescue assets is imperative to survival. Again, as so often happens in night rescues, it is important to use *all* rescue assets.

The lead story "The Safety Standdown: Has It Outlived Its Usefulness?" in the JAN '77 issue of APPROACH had a definite impact on us in VP-26. Your article served as food for thought in the planning of our . . . safety review, and we believe others might be interested in seeing how we planned and carried out our program . . . Shows what planning and imaginative thinking can do for the basic concept of the safety standdown. We feel that the scope . . . was on a greater scale than anything . . . tried before on a squadron level, and we were extremely gratified with the results.

CDR J. S. Yow, CO

SAFETY REVIEW

By LT Ted Bybel
VP-26 ASO

NAS Brunswick crash crew responding to drill.

THE safety review will affect all personnel in VP-26 in meaningful training for continued safe operations, personal survival, accident prevention, and safety awareness.

Just another safety review? Wrong! This time the Trident team went all out in creating a meaningful safety review that encompassed all aspects of P-3 operations. Gone were the day-long sessions in the station theater with endless movies and guest speakers preaching the abstract virtues of safety. Instead, the VP-26 safety department involved all hands in situations designed to impress squadron personnel with the real-life problems which could occur in their own particular jobs and work centers. The entire program sought to point out the "lessons learned" by other Navy commands in the hope that such a program could help the Tridents avoid any future mishaps.

Participation in the varied problems was not limited to VP-26 personnel, as the safety department utilized the expertise of many other on-base activities.

The morning session of the safety review divided the squadron into two groups – flightcrews and ground personnel. At 0730, all shops met to review maintenance reporting procedures and to reinforce safety attitudes and awareness. Meanwhile, the first of the squadron's 12 flightcrews was mustering in flight gear for static ditching and bailout drills, flight gear inspections, and safety surveys. In addition, some "special training" was scheduled for seven unalerted flightcrews.

With survey forms complete and flight gear checked, the first two crews proceeded to the airplanes for their static drills. Unlike most airborne drills, these ditches/bailouts emphasized what is done *after* water impact rather than the inflight preparations for the disaster. Crewmembers were responsible for physically locating and removing their assigned gear from the aircraft. The vast majority of the crewmembers knew what gear they were responsible for, but they had never lifted or carried the equipment through an escape hatch. Minor discrepancies were noted and many lessons were learned, but most importantly, the crewmembers left the drills with a deeper appreciation of

After ensuring that no fire was present and securing the aircraft, flightcrew members were removed from the plane.

Dispensary personnel give emergency first aid.

what their emergency duties actually entailed.

For CAC 1 and 12, another scenario was unfolding. As they left their aircraft, they were directed to a nearby bus for transportation to the NAS Brunswick swimming pool.

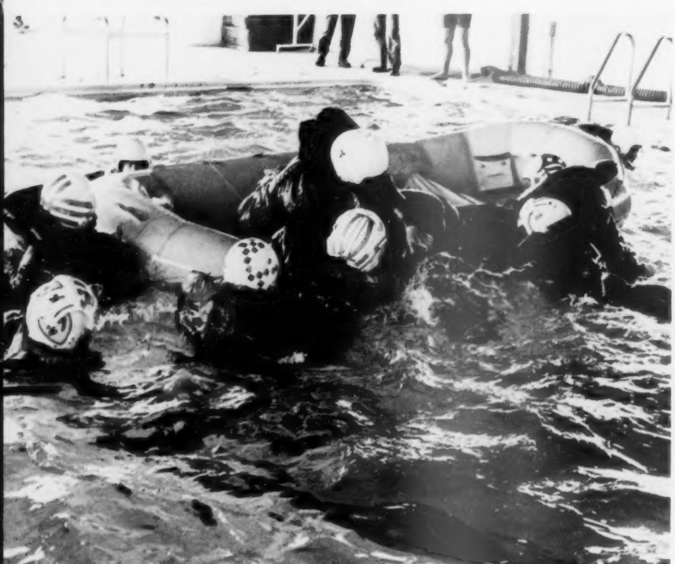
Lined around the pool were numerous uninflated LPAs, seven-man liferafts, and QD-1 (quick-donning) antiexposure suits. The crewmembers were about to get a waterborne review of their survival gear. They were given a quick refresher brief on the use of the QD-1, then proceeded to the deep end of the pool.

As part of the survival problem, the crewmen had only 4 minutes to get out of their LPAs, don the QD-1, get back into the LPA, jump in the water, and board the seven-man rafts. The actual launch of a fully packed raft was a first-time experience for most. The rafts had been purposely overturned so that the crewmembers would have to turn them upright before entering. Righting an overturned seven-man raft is not a difficult task, unless you are in an LPA and QD-1. The men soon discovered how hard it is to swim with the "Gibson Girl" radio, a Channel 15 sonobuoy, or other bulky equipment while in full survival gear. Following the water survival problem, the group received a lecture on the contents of their personal survival gear.

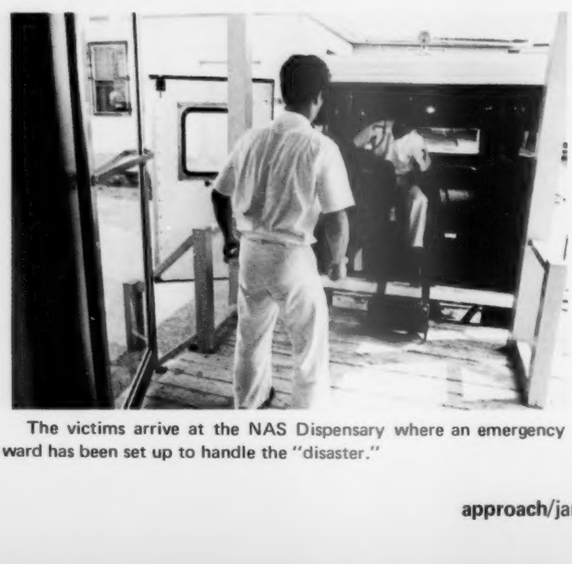
Meanwhile, something special was in store for Trident CAC 3. As CAC 3 finished the last of their drills, they were directed to another waiting bus. Once onboard, they were informed that they had just "crashed" somewhere in the Maine wilderness, and were now part of a land survival problem. Before their aircraft "exploded" and was consumed by fire, they had 90 seconds to take all of the gear that they could strip from the aircraft to aid in their survival. Anything they took was what they could have; anything not taken would be denied them during the problem. With gear in hand, the crew was bussed to the former SERE/Cold Weather Survival compound in the woods south of the naval air station.

After the crewmembers had been issued sleeping bags and the gear which they had taken from the airplane, they began preparing for a stay of unknown duration. The only

HM3 Johnson, Aviation Physiology, shows the proper procedure for donning a QD1.



Flightcrew members, having righted the seven-man raft, learn just how difficult it is to board in full survival gear.



The victims arrive at the NAS Dispensary where an emergency ward has been set up to handle the "disaster."

limitations placed on the crew were prohibitions against the cutting of live wood, the killing of large game, and a time limit on the emergency radios (simulated with walkie-talkies).

Back at the squadron, the remaining flightcrews were going through their ditching/bailout drills while ground personnel were involved in audits of tool control inventories, instrument calibration checks, aircraft ground handling procedures, GSE inspections, electronics gear writeups/writeoffs, and the examination of aircraft logbooks for discrepancies. At the same time, two more aircrews had been taken to the base pool for water survival training. Still another special drill had been set up for CAC 5 which would involve everyone on the NASB disaster network.

Just as CAC 5 was completing the last of its drills, corpsmen met the crew at the airplane with a box of moulages (plastic strap-on injuries). The imitation wounds ran the gamut from intestinal wounds to compound fractures and severed limbs. The crewmen were given old flight suits which had been torn open to expose the wounds. The aircraft ladder was then raised, and the aircraft was secured with the crewmembers still onboard. The PPC notified Trident maintenance control via base radio that they had just had a simulated crash on the taxiway, and requested activation of the disaster bill. Maintenance control alerted the crash crew and initiated a basewide crash response.

Almost immediately, the aircraft was surrounded by firetrucks and crash gear. The first problem encountered by the firefighters was to secure the crash site and to prevent any fire from breaking out. Once that was accomplished, the aircraft could then be boarded to remove the injured crewmembers. NAS Medical had responded to the drill with ambulance, doctors, nurses, and corpsmen. Once initial first aid had been completed, the injured were rushed from the crash scene. As the ambulances began to arrive at the base hospital, an emergency ward was set up to handle the mass influx of patients. This problem involved every department on the base's disaster network and provided excellent training for all participants. It also diverted attention from the "missing" crew in the woods which hadn't yet been missed by the squadron.

By this time, CAC 3 had constructed shelters and thoroughly reviewed first aid procedures at the encampment site. Since normal lunch hour had come and gone, the crewmembers were starting to get hungry. However, they were now allowed to use their radio, so they elected to attempt communications to effect some form of rescue. Since the frequency of their survival walkie-talkie was also the frequency monitored by the VP-26 duty office, the first person they talked to was a somewhat

Doctors and corpsmen sort out the injuries and treat the wounded.

Crewmen in full survival gear hit the water in a simulated ditch.

Lean-to shelters were constructed for a stay in the woods of unknown duration.

AO1 Tom Skoblicki, a former SERE instructor, shows the men of CAC 3 how to build a signal fire.

The NASB SAR crew arrives on the scene to "rescue" the downed crewmen from a night in the woods.

Plastic moulages (strap-on wounds) add realism to the medical problem.

CAC 3 displays their *esprit de crew,* with an ever-present crew flag.

After emergency first aid had been administered, the "victims" were taken by ambulance to the NAS Brunswick Dispensary.

surprised SDO.

The day's activities had already been quite hectic for the Trident duty officer, and this new problem was going to involve activating the detailed VP-26 Preaccident Plan. After determining the condition of the crewmembers and the general location of the accident site, the SDO set the wheels in motion by briefing the XO, notifying the NASB Search and Rescue team, and mustering the squadron at quarters to brief all Tridents on the "crash."

All departments within VP-26 were briefed to respond to this drill just as they would in the event of an actual aircraft loss. Personnel and flight jacket records were checked for possible discrepancies, and aircraft records for the past 6 months were examined by shops to determine if unnoticed trends had developed in the stricken aircraft.

Meanwhile, CAC 3 was told that a SAR helo would be proceeding to their general location, and a signal fire should be constructed so their exact position could be seen from the air. The SAR helo was indeed airborne on a local training flight at the time and passed overhead to add increased realism to the scenario. CAC 3 was told that the helo had marked their position but had to return to base due to low fuel.

The crewmembers were convinced that they would soon be rescued until a call from base radio reported that the helo was "down" and wouldn't be able to supply any support. This situation added psychological impact to the land survival problem. The crewmembers were tired, hungry, and facing the prospect of spending an unexpected night in the woods without food.

Back at the squadron, record checks and trend analysis of the aircraft had been completed, and the squadron had learned a great deal about preaccident planning, which many personnel had taken for granted before this safety review.

When the last aircrew had finished its ditching/bailout drills, it was transported to Aviation Physiology where a brief refresher was provided in high altitude physiology, rapid decompression, and the "buddy-breathing system" on the P-3's supplemental oxygen bottles. Other aircrews were reviewing SAR procedures, while ground personnel were receiving training on P-3 survival equipment which they might be exposed to as passengers on squadron aircraft.

The day's activities were drawing to a close with only one unresolved situation – CAC 3 was still in the woods, but NASB SAR pilots were about to take care of that loose end. CAC 3 was notified that the SAR helo had been repaired and would be airborne shortly. They were directed to break camp and proceed to an open area one-half mile north of their location where a helo rescue could be effected. With all deliberate speed, the crewmembers made their way to the landing zone pickup, capping the day's activities with a rather dramatic finish.

A routine safety review? Hardly! It required very detailed planning and coordination by the VP-26 safety department and the cooperation of all Tridents and several NAS departments to make something of this scale work as smoothly as it did. The primary objective of the safety review was the involvement of the entire squadron in meaningful safety training, and that goal was well met. The Tridents gained from the day's activities a new awareness in their jobs and a greater insight into themselves which could help them prevent an accident or better cope with an unexpected disaster.

For the various NAS departments, it afforded the opportunity to exercise their disaster preparedness plans and to uncover any possible discrepancies. For everyone involved, it was a very different safety review. The most tangible benefit will be continued safe operations and an extension of VP-26's impressive safety record – 120,000 accident-free flight hours. After all, that's what a safety review is all about.

INATTENTION

THE pilot of a UH-1 was airborne on a familiarization flight. Flying with him was an authorized civilian engineer observer who was required to know the lateral flying qualities of the H-1.

Prior to the flight the pilot and engineer conducted a thorough crew briefing. They suited up and proceeded to the helicopter and together conducted a careful preflight. The preflight revealed no discrepancies, and the two climbed aboard and strapped in. Before starting, the pilot reviewed the emergency egress procedures.

They took off. The first part of the flight was performed at altitude and included demonstrations and discussions of various flight evaluation techniques. After about an hour, the pilot returned to Homefield and received a clearance to conduct low-level maneuvers over the station's helicopter operating area, between runways. The pilot was cautioned about a work crew in the area. He established a hover in the area, well clear of the runway and work crew. He demonstrated several vertical landings and turns on a spot. Then he shot two throttle-chop landings from a 5-foot hover and demonstrated rearward flight. Next he demonstrated left lateral flight up to 20 knots.

At this point, nearly everything had been completed, and it was almost time to make a final landing. The last maneuver, a right lateral translation, was begun and continued, parallel to the runway, for about 200 yards, followed by a vertical landing. Just before touchdown the pilot remembered the work crew, which was out of sight, and his attention was diverted.

While trying to see where the crew was and continuing the landing, the UH-1's skid contacted the ground and dug in. A rapid roll developed which the pilot was unable to stop with left cyclic and an up collective. The main rotor blades contacted the ground; the helo rolled over and came to rest on its starboard side. The two occupants cleared the aircraft after securing the engine and cockpit and stood by as the crash crew reached the scene. No one was hurt, but the helo sustained substantial damage.

The pilot was an experienced H-1 pilot. Further, he had completed recently the maneuvers preceding the accident with a qualified flight instructor. He was well prepared for the flight and had made up a set of data cards indicating that he had reviewed all maneuvers to be performed on the flight.

The pilot's distraction during the landing caused less than the required precise control. The aft portion of the right skid hit the ground with right/aft translation. It's possible he could have prevented the rollover with immediate, full down collective and left cyclic application. However, left cyclic alone could not do the job.

Strangely, the pilot didn't know, at the time, about the insidious rollover characteristics of helicopters. He does now. Articles concerning rollover characteristics have previously been published, and all helo pilots must be knowledgeable of this phenomenon.

(For the benefit of new Fleet pilots and old heads who missed the last article on dynamic rollover, we are reprinting the following article which appeared in the MAY '75 issue of APPROACH. – Ed.)

Even though NATOPS changes have been promulgated, knowledge in the Fleet as to the actual causes of dynamic rollover is suspect. This is the opinion of instructors at the Aviation Safety School where prospective helo ASOs have indicated a lack of knowledge of the subject.

Done in: DYNAMICALLY!

By Capt J. P. Cress, USMC
Naval Postgraduate School

ANY helicopter pilot performing a takeoff or landing on a sloping or rough surface has been subjected to conditions which, with even the slightest inattentiveness to developing rates of change in attitude, can result in almost certain destruction of his aircraft. Until recently, accidents occurring under such circumstances were simply checked off as pilot error or undetermined. An Air Force stability study into the loss of a CH-3C in 1971, however, has disclosed previously unknown characteristics of helos rotating about wheels or skids. This is known as dynamic rollover.

Since 1970, the Navy has determined that seven major helicopter accidents (14 percent of all Navy/Marine pilot factor accidents for this period) were attributable to dynamic rollover. What is it? When does it happen? Is it preventable? If so, how?

Perhaps the best way to describe dynamic rollover is to first describe what it is not. It is not a simple matter of the

Aircraft	Static Rollover Angle	Critical Rollover Angle
UH-1	35°	17°
AH-1	33°	15°
SH-2	78°	(Not available)
SH-3	40°	17°
CH-46	(Not available)	(Not available)
CH-53	(Not available)	15°
TH-57	28°	10°

Fig. 1

helo being placed on a slope steeper than it can negotiate, such as the case of an automobile rolling over after having been driven onto a steep embankment. This could be called static rollover. A typical Fleet helicopter, e.g., an H-3, normally configured and with rotors stopped, could withstand slopes on the order of 40 degrees from horizontal prior to static rollover. On the other hand, studies have shown that a helo may be irreversibly committed to dynamic rollover at angles less than 10 degrees (depending on the roll rate). It is clear, therefore, that dynamic and static rollover are quite different.

Is dynamic rollover something which results from attempting to land on or depart from a slope in excess of the lateral trim limitation of the aircraft? Clearly, there are slope angles which, although less steep than static rollover angles, are nonetheless beyond the lateral controllability of the aircraft. Therefore, even if the helicopter were plumbed onto such a slope, it would be impossible to raise it to skid (wheel) level for takeoff due to lateral control limits. The angle of slope which would require maximum lateral cyclic input to trim the skids level is often referred to as the "critical rollover angle." (Values of critical rollover angles for some helos are shown in Fig. 1.) By no means must a helicopter exceed or even equal the critical rollover angle before it is committed to dynamic rollover. Thus it would be foolish for the helicopter pilot to consider himself invulnerable to dynamic rollover merely because he hadn't approached the critical rollover angle.

Dynamic rollover, then, isn't simply a function of slope angle or lateral control authority. While these can be aggravating factors, a more direct contributor is buildup of angular velocity of the mass of the helo about the skid in contact with the deck. The insidious aspect of the whole process is that acceptable roll rates and accelerations about the CG of the aircraft in flight are not acceptable about a skid in contact with the deck. Thus, a pilot encountering dynamic rollover may not recognize it as such, because roll rates which precipitate it are within a range which he would normally allow in flight.

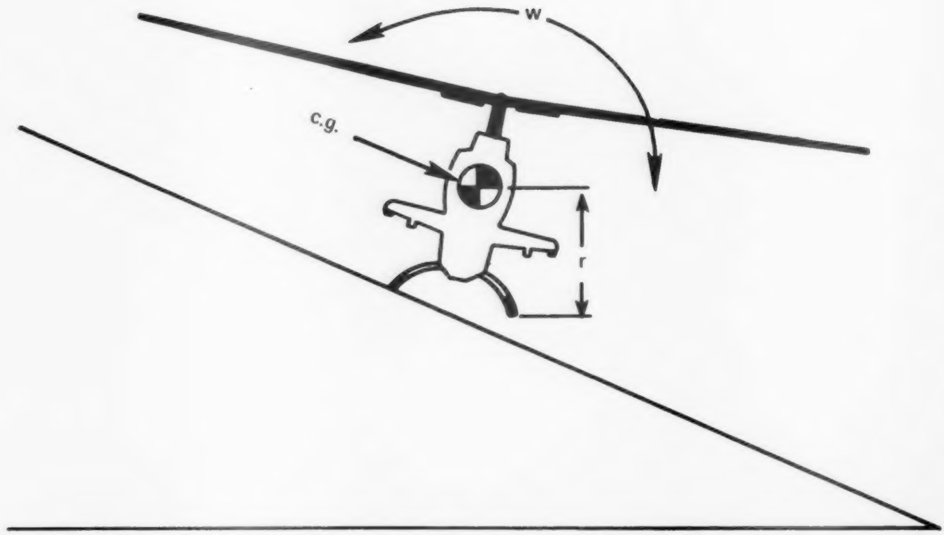
Two other factors work in conjunction with angular velocity. These are total mass of the helicopter and the distance of the CG from the landing gear. The three parameters can be combined arithmetically in the expression for angular momentum. Let angular momentum be represented by H, mass by m, distance of the CG from the landing gear by r, and angular velocity (roll rate) by w. Then:

$$H = mr^2 w$$

Dynamic rollover is purely and simply the result of the helicopter developing excess angular momentum about the skid in contact with the deck. It is clear from the formula that the greater the roll rate, the higher the gross weight, and the greater the lateral and vertical CG displacement from the gear, the greater the likelihood of developing angular momentum greater than can be countered with full opposite lateral cyclic. The inevitable consequence: a multimillion dollar fragmentation machine.

Often, in an attempt to meet other requirements, the designer necessarily forces a high CG on the pilot. Other variables, such as downslope fuel slosh or lateral cargo displacement, can compound the "r" contribution to the momentum in roll. To the extent that the mission may force high gross weight on the pilot, he also has only limited control of the "m" variable. The angular velocity developed in the initial stages of a rolling maneuver, however, is almost purely a function of the rate of the pilot's control input and ability to trim the aircraft. Thus to the degree that he is capable of smooth and deliberate control input, the pilot is a major factor in determining his initial susceptibility to dynamic rollover.

Let's suppose that everything is going against the pilot. The wind is blowing upslope. He's in a high CG, single-rotor helo with a high tail rotor. He's taking off at high gross weight, rotating about the right skid, which is upslope. With full right lateral cyclic, he adds a little too much left rudder and pulls collective a little too abruptly. A roll rate develops upslope, resulting in an angle to the upslope side of the skids level. The pilot counters with full left lateral



Horizontal

cyclic. The upslope roll rate diminishes but doesn't stop. In less than 2 seconds the aircraft will become a statistic unless thrust, a major contributor to the angular roll rate, is rapidly but smoothly reduced. The pilot, being careful not to bounce on the downslope skid, *must reduce collective.* This may allow recovery even though lateral control authority has been exceeded.

A great deal more can be said about rollover. For instance, it should be clear that it need not occur exclusively on slopes. It could result from a combination of lateral cyclic application in conjunction with moderate collective from corrugated steel matting or ridged macadam.[1] It could result from skid contact with a heaving deck in combination with lateral stick input. It could worsen the already bad situation of a deck launch with one gear still chained. To a lesser degree, this rollover motion can occur about the pitch axis when inducing forward cyclic in conjunction with collective when commencing a takeoff roll with the toes of the skids or nosewheel in contact with the deck. In all cases, smooth reduction of collective is the most effective corrective action the pilot can take to prevent dynamic rollover.

[1] "Tilt, Rollover, Upset," U.S. *Army Aviation Digest*, May 1973.

From FY-60 thru 31 March 1976, 153 Navy/Marine helicopters rolled over. Fifty-five of these may have involved dynamic rollover. Only 4 are known to have occurred on sloping surfaces. – Ed.

Posters on the Back Covers

WITH this issue, APPROACH institutes a new policy of printing safety posters back-to-back on the back covers. Other than outsized technical or instructional posters which do not lend themselves to this format, the back cover posters will constitute the entire Naval Safety Center poster program after current stocks are exhausted.

As always, poster ideas are solicited from the Fleet. Suitable credit will be given its author and unit. It is recommended that these posters be utilized singly or in groupings for bulletin boards or other display areas.

DISSIMILAR FORMATION

By LT Randy Bazemore
VA-75

IT could be any CV, anytime, anyplace. Type training is currently in progress. Weather is VFR. At 8000 feet, an A-6 leads another A-6, with a nugget pilot aboard, around the Delta pattern for a Case 1 "zip-lip" recovery. No sweat. "Just a daytime recovery," the A-6E veteran pilot thinks to himself as he awaits, anticipating a leisurely descent behind the EA-6B below.

Suddenly, reflected light from the port side draws the lead's attention, and he notices an S-3, tucked in close, the pilot eagerly trying to display the new VS image.

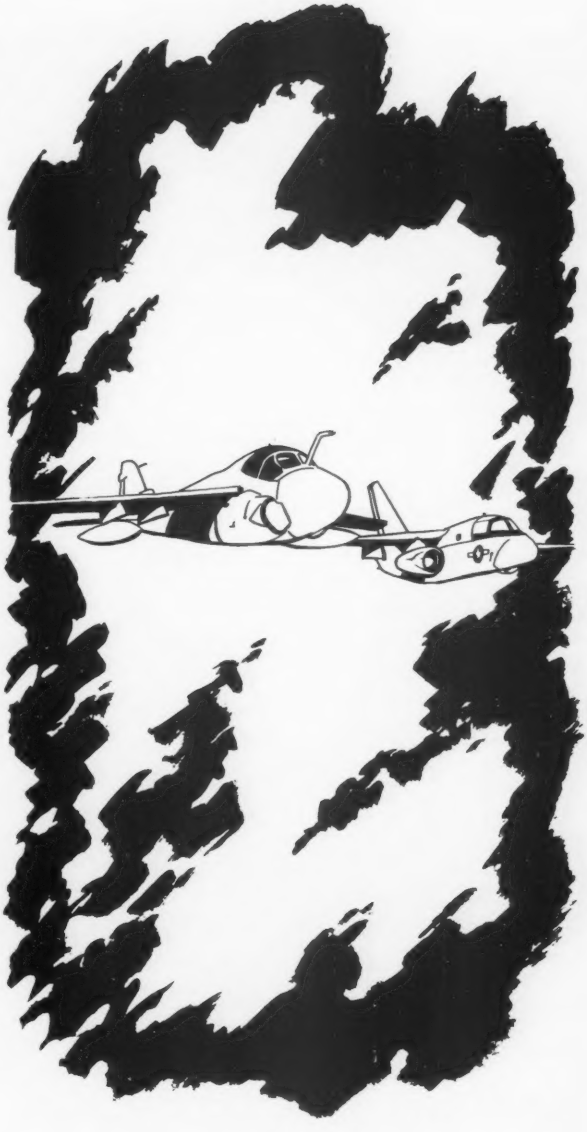
"Guess I'll have to oblige this fellow," says the A-6 pilot to his BN.

The formation now consists of an S-3 and two A-6s. The flight searches for the EA-6B that should be their interval.

"Maybe he didn't launch," the BN nervously reassures the pilot, who shifts his scan below. The deck is now clear, and several *Phantoms* are smoking into the break. Lead starts his flight down by dropping his hook and looking for his interval and conflicting traffic. At 3000 feet and 3 miles aft of the ship, the veteran A-6 pilot smoothly commences a port turn to the base recovery course, careful not to disturb the Sierra Hotel S-3 tucked in closely on his port wing. Descent is made to 1200 feet. At 4 miles astern, the lead realizes that his interval is trapping. A "drag it" signal is passed to the BN to give No. 3, but the S-3 is still on the port side. It's now too late to detach anyone for a straight-in landing.

The situation continues to develop. The BN tells the veteran pilot that the EA-6B is now No. 4 on the second A-6's wing. So, now a four-plane, multitype aircraft formation, unbriefed and unprepared, is approaching the bow. At the bow, lead kisses off the S-3, who misses the signal the first time but catches it the second. Lead breaks 17 seconds later and closes slowly on the S-3, who manages to go slightly long in the groove. Number 2 A-6 flies at 150 KIAS until abeam the bow and sees the lead also long in the groove. However, he decides to fly the normal pattern, and lead gets waved off. The EA-6B bolters, and lead goes around for another approach. Mix in with this a pitching deck, no divert, increasingly poor visibility, aircraft getting cut out of the pattern, low fuel, etc. – and a sequence of events leading to an accident exists.

The scenario may someday happen to you if unbriefed, dissimilar formation is tolerated or exercised around any CV. Dissimilar formation has its time and place, but any formation – similar or dissimilar – should be briefed thoroughly and in accordance with NATOPS and



instructions pertaining to each particular carrier air wing. All aspects of the flight should be covered: rendezvous, airspeeds, altitudes, break intervals, hand signals, and NORDOs/emergencies. Unless it is necessary, don't fly dissimilar formation. Your job is to get back to the ship safely. Use the time in the Delta pattern to think about the upcoming pass rather than trying to sort out a strange formation. ◄

HOT takeoffs can lead to COLD statistics

"WE'LL make a standard four-plane takeoff with a 10-second interval. Since we're operating out of a strange field, there are going to be a lot of people watching us, so let's look sharp and expedite the rendezvous. I want you all aboard by the time I steady up on our initial heading."

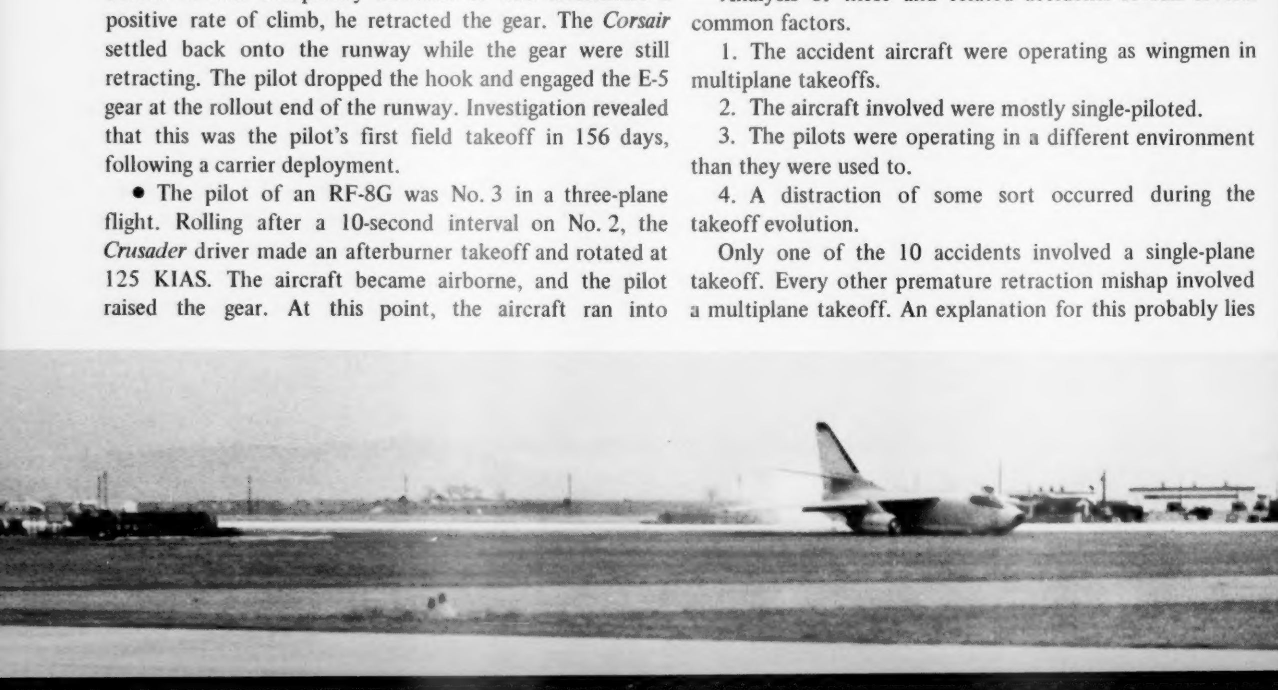
This briefing spiel could very well precede a pilot-factor accident that is completely preventable – premature retraction of the landing gear followed by the aircraft returning to the runway. Although these mishaps are completely preventable, the fact remains that over the years, the Navy continues to have accidents of this nature. In the past 7 years, 10 aircraft have suffered damage or destruction in accidents caused by retraction of the wheels before the aircraft was safely airborne. Some definite trends and common denominators can be identified by studying some of the typical accidents.

- The pilot was No. 2 in a four-plane flight of A-7s. He commenced his takeoff roll 10 seconds after the lead. Before he was completely airborne or had established a positive rate of climb, he retracted the gear. The *Corsair* settled back onto the runway while the gear were still retracting. The pilot dropped the hook and engaged the E-5 gear at the rollout end of the runway. Investigation revealed that this was the pilot's first field takeoff in 156 days, following a carrier deployment.
- The pilot of an RF-8G was No. 3 in a three-plane flight. Rolling after a 10-second interval on No. 2, the *Crusader* driver made an afterburner takeoff and rotated at 125 KIAS. The aircraft became airborne, and the pilot raised the gear. At this point, the aircraft ran into turbulence from the departing aircrafts' jetwash and settled back onto the runway. The pilot was used to operating off a carrier and raising the gear immediately after takeoff.
- An A-7 pilot had mounted a home movie camera in the cockpit to film the takeoff roll as No. 2 in a two-plane flight. The pilot placed his hand on the landing gear handle to ensure he didn't forget to raise the gear as his attention was focused on the field of view of the camera. Sometime during the takeoff roll, the pilot inadvertently raised the gear handle. The *Corsair* settled onto the runway with the gear up.
- Another A-7 pilot was flying as escort for a banner tow aircraft. The pilot rolled shortly after the banner aircraft and raised his landing gear after he was airborne. During this period, he was concentrating on the banner. His preoccupation with the banner takeoff apparently caused him to rotate early, and his aircraft settled back onto the runway due to insufficient flying speed.

Analysis of these and related accidents reveals several common factors.

1. The accident aircraft were operating as wingmen in multiplane takeoffs.
2. The aircraft involved were mostly single-piloted.
3. The pilots were operating in a different environment than they were used to.
4. A distraction of some sort occurred during the takeoff evolution.

Only one of the 10 accidents involved a single-plane takeoff. Every other premature retraction mishap involved a multiplane takeoff. An explanation for this probably lies



in the desire of the pilots to make an expeditious rendezvous, the different habit patterns required during a multiplane takeoff, and distractions associated with other aircraft on the runways.

Another general conclusion that can be made is that most of these mishaps involved single-piloted aircraft – 8 out of 10 to be exact. Interestingly, of these eight mishaps, seven involved the A-7/F-8 series aircraft. While the value of a second person in the cockpit to back up the pilot on airspeed, rotation speed, line speed checks, etc. is an obvious asset in preventing premature gear retractions, why the similarly designed A-7 and F-8 have been involved almost exclusively is difficult to answer. There have been a lot of single-seat A-4 takeoffs during this time (1970-1977), but according to the computer, not one has fallen victim to settling back on the runway. Whatever the explanation, it is a fact for all *Crusader* and *Corsair* pilots to bear in mind.

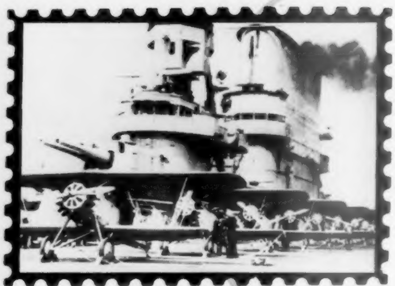
Somewhat easier to understand is how different operating conditions can lead to broken habit patterns and accidents. Some examples: Pilots operating off of ships are encouraged to raise the gear as soon as they are airborne. Aircrew accustomed to sea level operating conditions can be fooled by the degraded engine performance of high altitude ops and the longer takeoff rolls. Pilots used to operating as a single flight find new procedures and different techniques for multiplane takeoffs. All these variances in normal habit patterns set up the opportunity for pilot error – if the pilot is not aware of them or of exercising due caution and headwork.

A final factor that often appears in this type of mishap is a rather intangible concept known as "a desire to look good." Every aviator wants to look good around the field where he is watched by fellow aviators and nonaviators alike. The low transition, rapid acceleration close to the runway and zoom climb to catch the lead are all eye-catching maneuvers. What's more, there is a legitimate and necessary requirement to rendezvous a flight expeditiously. But the few seconds saved by snapping up the wheels the instant they break the ground isn't worth the risk. *Nobody* is impressed by an airplane scraping along the runway without wheels – spewing metal parts, sparks, and fuel as it goes. And it sure makes for a slow rendezvous!

One might logically ask how an aircraft can become airborne at all if it really isn't ready to fly. The answer lies in aerodynamics: ground effect. Without getting too involved, ground effect affects normal airflow patterns because the three-dimensional airflow pattern is altered close to the ground or runway. This different airflow pattern reduces induced drag and thus lessens thrust required to fly *as long as the aircraft is very close to the ground.* The problem is, the aircraft cannot climb out of ground effect if it has insufficient airspeed to compensate for the increased drag and thrust required without ground effect. Any distraction, inadvertent stick movement, or turbulence can cause an aircraft riding in ground effect to return to the runway before it can accelerate to flying speed.

Ten mishaps of this variety over the past 7 years certainly don't indicate a major accident trend, particularly when compared to the literally millions of takeoffs conducted safely over the same time period. Nevertheless, these accidents represent four destroyed aircraft, substantial damage to six others, and one fatality. Perhaps the most frustrating aspect of these accidents is how easily they could have been prevented. Thoroughly briefing all takeoffs – particularly when they involve a deviation from recent operations and/or multiplane hops among single-piloted aircraft – should be sufficient to overcome most of the typical factors identified in premature gear retraction accidents. The other factors can be overcome by good headwork, attention to the task at hand, and just plain, solid, basic airmanship.

Most NATOPS manuals have a statement to the effect that "the gear should be raised when a positive rate of climb has been established and the airplane can no longer be landed on the runway." Following this simple guideline will virtually eliminate the problem. Let's eliminate these simple problems – so we can get on to tackling the really tough ones. ◄



Letters

Taxi Instructions or Clearance?

Chicago, IL – In the OCT '77 issue of APPROACH, the opening sentence of the story "Loss of Control on Takeoff" reminded me of a conversation I once heard on tower frequency. To understand the humor of the conversation, you must first be aware that airline pilots maintain a tower is not privileged to issue "instructions," but instead issues "clearances." The conversation started just as in your story.

"Tower, this is 134, request taxi instructions." Before the tower could reply, a voice from some other airplane spoke out, "To taxi the aircraft, release the parking brake and advance the throttles."

Captain R. A. Stone
Director of Flight Safety
United Airlines

Re "Ten Commandments of Helicopter Flying"

NAS Memphis – Kudos to Mr. Jack LaBar and the helo desk for these very valid reminders in the NOV '77 issue of APPROACH.

I *He who inspecteth not his aircraft gives his angels cause to concern him.*

. . . reminds me of the time that I discovered a 10-quart galvanized bucket on the after part of the transmission gearbox deck of an H-34, with the turtle-back cowling buckled up around it.

II *Thou shalt not become airborne without first ascertaining the level of thy propellant.*

. . . how about the time an H-53 crash-landed due to fuel starvation while flying 7 miles to Homeplate from another military airfield which had thousands of gallons of JP-4 in the fuel pits?

III *Let infinite discretion govern thy movement near the ground, for vast is thy area of destruction.*

. . . cannot an H-53, taxiing near light civil aircraft at Podunk Airport, well be compared to the proverbial bull in . . .

IV *Thy rotor RPM is thy staff of life; without it thou shalt surely perish.*

Especially now, in the days of more powerful engines and infrequent max gross loads, this message should be tattooed on the foreheads of all HT-18 graduates; how to avoid low RPM should be pumped in between the ears.

V *Thou shalt maintain thy speed between ten and four hundred feet, lest the earth rise and smite thee.*

For some aircraft, perhaps the altitudes should be changed to ". . . between 10 and 600 feet . . . " but the NATOPS graph of altitude versus airspeed still contains the dead man's curve or "avoid" areas. The moral is that helos aren't to be used routinely as elevators.

VI *Thou shalt not make a trial of thy center of gravity, lest thou dash thy foot against a stone.*

. . . so that's why I had a sandbag for a copilot on H-13 solo training hops! . . . then there's the time when the H-1, packed with a command control team and their communications gear, ran out of aft cyclic at low airspeed, and had to divert to a long sod runway for a fast skid-on landing.

VII *Thou shalt not let thy confidence exceed thy ability, for broad is the way to destruction.*

I'd rather compare this to oldness and boldness than to hummingbird brains and alligator tails. The impossible task *should* take longer.

VIII *He that doeth his approach and alloweth the wind to turn behind him shall surely make restitution.*

The danger here is that this commandment is untrue just often enough for complacency to alight on the pilot's shoulder . . . and the air boss' microphone . . . and the tower operator's anemograph . . . and the airfield operation officer's tattered windsock pole . . . and the LSE's wands.

IX *He who allows his tail rotor to catch in the thorns curseth his children and his children's children.*

Indeed! Main rotor blades require bigger thorns for greater curses. For instance, there was the time when I was nominated for the RVN Department of Interior Tree Trimmer of the Year award, for an incident on the Ben Hai River bank in 1969 . . .

X *Observe thou this parable, lest on the morrow thy friends mourn thee.*

This is a great way to make education less costly than reeducation via the hard knocks school, fellow rotor-heads. Let's read and heed.

Should there be another?

XI *As torque required exceedeth power available, kiss thy altitude goodby and speedily performeth thy landing checklist, for touchdown is nigh upon thee.*

. . . but perhaps Commandment IV covers this area well.

CWO4 J. S. Chastain, USMC
H&HS-90, MATSG-90

Get Tough with NATOPS Violators

San Diego, CA – Had I been CNO and read "Some Thoughts for Those in Authority" (AUG '77 APPROACH), I would have been asking some serious questions of my Fleet

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commanders. In that same issue was a letter from Maj Cosentino of the 36th TFW, USAF. These two pieces taken together vividly illustrate the reality of the attitudes of those in authority toward the military aviation safety programs.

Major Cosentino's pragmatic approach to readiness as a function of PK (probability of kill) appears to totally ignore the fact that the regulations and directives which we are supposed to operate under daily were designed to provide maximum combat readiness, coincident with the highest "PCA" (my own term for Probability of Conserving Assets) in a peacetime environment. After all, what is the PK of an aircraft with strike damage as a result of a NATOPS violation? What is the PK of a second tour RIO who is planted 6 feet under because of an unauthorized maneuver by his XO? Rules and regulations can hardly be said to "reduce the acceptable level of readiness PK" when each of the above real-life accidents could have been avoided had published regulations (military orders, if I'm not mistaken) been adhered to. Unfortunately, "Some thoughts..." documents the fact that those rules and regulations are all too often flagrantly disregarded, not by some ensign or lieutenant junior grade in need of a military haircut, but by his CO, XO, or Ops boss.

If these "military managers" pulled analogous actions in the civilian sector, they would be out of business in no time – they could not afford liability insurance. Since the only accountability that those in authority have is to their superiors, I would entreat wing commanders and flag officers to abandon the "soft approach" to NATOPS violators and become ruthless toward COs who openly and willfully accept anything less than 100 percent dedication to the Navy's safety program. Only by doing this can we expect to stop the senseless loss of aircraft and personnel assets as a result of callous disregard for safety.

LT Lonnie Hearne, USNR-R
VP 0617

A-7 Fuel System Improvements

Grand Prairie, TX – Attaboy! Your article on fuel systems and their foibles ("Beware the Fuel System!", OCT '77) is timely and informative.

As stated, the A-7 fuel system is "sophisticated," but provides the aviator with reliable transfer as long as nothing fails. If transfer failure occurs, there are few pilot-controlled options that will restore motive flow transfer sequencing.

There is something new on the horizon! A-7E BuNo 160565 and subsequent will have a pilot-operated switch that will give the aviator an option of *forcing* the electrical logic of the motive flow system to transfer from either the wing or the aft tank. (In NORMAL, the switch will have no effect on automatic transfer.)

As usual, improvements are often a double-edged sword. On one side, we have provided the pilot with a means of recovering trapped fuel if an automatic transfer failure occurs. The other side is that we have increased the number of components that the pilot must monitor to assure proper fuel transfer. (The more switches in a system, the better the chance that one of those switches will be improperly positioned.) The change is good – no question about that – but the pilot *must understand the fuel system* in order to use the switch properly.

In addition to the A-7E FUEL LOW light, a supplementary SUMP LOW caution light will be added. Illumination of this light indicates that 400 ± 50 pounds of fuel remain in the sump (maybe 10 minutes of fuel at cruise). Should abnormal fuel distribution exist in the fuselage similar to that which existed in the A-7B cited under miscellaneous mishaps of your article, the SUMP LOW light should alert the pilot to this condition.

The above description of the upcoming change is admittedly superficial. The NATOPS fuel-related emergency procedures will have to be revised.

Robert C. Blakely
Field Service Engineering - Fuel Systems
Vought Corporation

Three-Engine Ferry

FPO, New York – In September 1977, VP-56 became involved in the possibility of having to ferry a P-3 aircraft on three engines from Fort Lauderdale, FL to Jacksonville. The commanding officer's first question, "What's involved?", launched the NATOPS officer into a fact-finding search which ended several days later with the aircraft being repaired in Fort Lauderdale.

The first step was to consult the NATOPS manual for pertinent information including predicted power, distance to liftoff, and distance from liftoff to 50-foot height. The zero fuel weight was checked, and a fuel load for the 280-mile flight was determined. The local temperature and prevailing winds were checked for a ball park estimate along with approach plates to find out what kind of obstacles were in the area. Someone also remembered reading an article in APPROACH on the subject, so some issues were searched, and an article written by LT Charles T. Butler of VP-31 in the JUL '77 issue was found.

LT Butler's article, with comments by John Christiansen, Chief Pilot Military Flying of Lockheed-California, was reread and digested, and a shared concern was felt for the inadequate presentation in NATOPS. The article dealt with determining refusal speed during three-engine ferry operations and the associated hazards involved. Even though an engine isn't expected to quit at the most critical point in the takeoff roll, refusal speed is computed for every four-engine takeoff. Why not for a three-engine ferry? NATOPS does not address refusal speed for a three-engine ferry. As a result, the information provided by LT Butler was used, and a refusal distance of 4027 was determined. However, the liftoff distance was calculated to be 4310 feet. This means that once refusal is passed, the aircraft cannot be stopped on the runway. Yet in this instance, the minimum control speeds, Vmc_{ground} and Vmc_{air}, had not been reached. Consequently, the aircraft cannot be controlled on the ground or in the air until sufficient airspeed is gained. That's 283 feet of "You're damned if you do, and you're damned if you don't."

But was a three-engine ferry really necessary? There were other viable alternatives, including sending a maintenance crew and engine via Interstate 95. Everyone was in agreement that based on the risks involved, a three-engine ferry should not be attempted. To justify a three-engine ferry, it would have been necessary to accept 283 feet of uncertainty. Would you accept the uncertainty of only 283 feet? If you accept 283 feet, will you accept 500 or 1000 feet?

In conclusion, all the planning proved to be an invaluable learning experience. However, despite the excellence of the APPROACH article, I felt a little strange using a magazine article to compute takeoff performance data. I have to agree with LT Butler that the three-engine information should be incorporated into the NATOPS manual ASAP. If the recent proposed change to the P-3 NATOPS conference by LT Butler is accepted, it may be some time before it appears in print. We are hopeful that the next squadron which has to weigh three-engine ferry considerations won't have to go sifting through back issues to find the JUL '77 APPROACH.

LT R. D. St. Germain
PATRON FIFTY-SIX

approach

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NAVAIR 00-75-510

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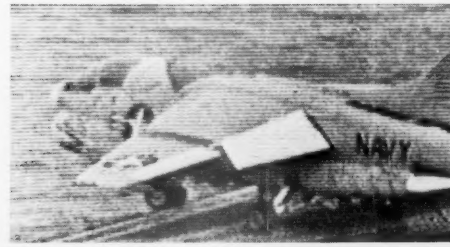

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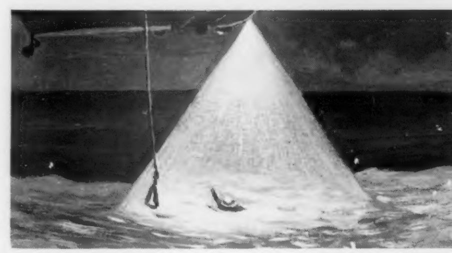

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A Naval Safety Center Publication

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DISTRIBUTION/Requests for distribution changes should be directed to NAVSAFECEN, NAS Norfolk, VA 23511, Attn: Safety Publications Department. Phone: Area Code 804, 444-1321.

PRINTING/Issuance of this periodical approved in accordance with Department of the Navy Publications and Printing Regulations, NAVEXOS P-35. Library of Congress Catalog No. 57 60020.

CREDITS/The turboprop T-44A is the Navy's new advanced trainer. Produced by Beech Aircraft Corporation, the T-44A will replace the TS-2A and TS-2B aircraft. This month's cover is by staff artist Blake Rader. Pg. 6-8 Photos courtesy the author; Pg. 18-22 Photos courtesy the author.

 ☆ U. S. GOVERNMENT PRINTING OFFICE: 1977—735-047/18

ZERO ACCIDENTS IS NO ACCIDENT!

YOU HAVE TO WORK AT IT.

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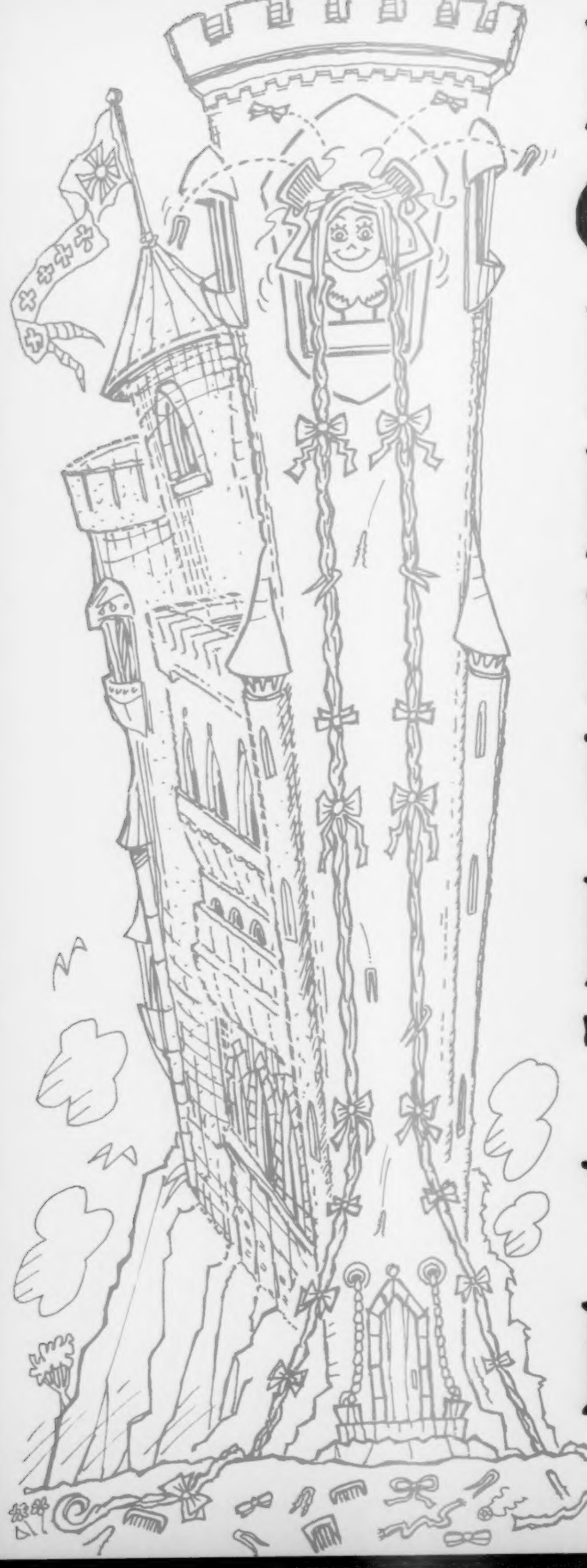
NAVAL SAFETY CENTER
NAVAL AIR STATION
NORFOLK, VIRGINIA 23511

C70-GS-1177



LADIES ON THE FLIGHT LINE, DO NOT USE FOD TO PUT YOUR HAIR UP.

C79-GI-1177

Idea submitted by AD2 Ann C. Laymon, HS-84, W/C 110